



U.S. Department of Energy
Idaho Operations Office

HWMA/RCRA Closure Plan for the Basin Facility Basin Water Treatment System

Voluntary Consent Order NEW-CPP-016 Action Plan

November 2007

Idaho Cleanup Project

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**Prepared for the
U.S. Department of Energy
DOE Idaho Operations Office**

ABSTRACT

This Hazardous Waste Management Act/Resource Conservation and Recovery Act closure plan for the Basin Water Treatment System located in the Basin Facility (CPP-603), Idaho Nuclear Technology and Engineering Center (INTEC), Idaho National Laboratory Site, was developed to meet future milestones established under the Voluntary Consent Order. The system to be closed includes units and associated ancillary equipment included in the Voluntary Consent Order NEW-CPP-016 Action Plan and Voluntary Consent Order SITE-TANK-005 Tank Systems INTEC-077 and INTEC-078 that were determined to have managed hazardous waste. The Basin Water Treatment System will be closed in accordance with the requirements of the Hazardous Waste Management Act/Resource Conservation and Recovery Act, as implemented by the Idaho Administrative Procedures Act 58.01.05.009 and 40 Code of Federal Regulations 265, to achieve “clean closure” of the tank system. This closure plan presents the closure performance standards and methods of achieving those standards for the Basin Water Treatment System.

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ACRONYMS

AL	action level
BWTS	Basin Water Treatment System
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CPP	Chemical Processing Plant
DEQ	State of Idaho Department of Environmental Quality
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
EPA	U.S. Environmental Protection Agency
FFA/CO	Federal Facility Agreement and Consent Order
HEPA	high-efficiency particulate air
HIC	high-integrity container
HWD	hazardous waste determination
HWMA	Hazardous Waste Management Act
HWN	hazardous waste number
ICP	Idaho Cleanup Project
ICPP	Idaho Chemical Processing Plant
IDAPA	Idaho Administrative Procedures Act
INEEL	Idaho National Engineering and Environmental Laboratory
INL	Idaho National Laboratory
INTEC	Idaho Nuclear Technology and Engineering Center
LDR	land disposal restriction
PE	professional engineer
PEWE	process equipment waste evaporator
RCRA	Resource Conservation and Recovery Act
RWMC	Radioactive Waste Management Complex
TSDF	treatment, storage, and disposal facility

USC	United States Code
VCO	Voluntary Consent Order

HWMA/RCRA Closure Plan for the Basin Facility Basin Water Treatment System

Voluntary Consent Order NEW-CPP-016 Action Plan

1. INTRODUCTION

This Hazardous Waste Management Act (HWMA) (State of Idaho 1983)/Resource Conservation and Recovery Act (RCRA) (42 United States Code [USC] 6901 et seq. 1976) closure plan has been prepared for the Basin Facility Basin Water Treatment System (hereinafter referred to as Basin Water Treatment System [BWTS]), located at the Idaho Nuclear Technology and Engineering Center (INTEC), Idaho National Laboratory (INL)^a Site.

The Basin Facility (CPP-603) at INTEC, formerly known as the Idaho Chemical Processing Plant (ICPP or CPP), contains three separate pools (or basins), interconnected by a transfer canal, for underwater storage of spent nuclear fuel. The water-filled basins were used to provide radiation shielding and cooling. To prevent the basin water from becoming overly radioactive, radioactive particulates and ions were continuously removed from the basin water by the BWTS, which is comprised of the Old Ion Exchange Subsystem (Voluntary Consent Order [VCO] Tank System INTEC-077; SITE-TANK-005 Action Plan), the New Ion Exchange Subsystem (VCO NEW-CPP-016 Action Plan), the Multi-Media Sand Filtration Subsystem (VCO NEW-CPP-016 Action Plan), the Reverse Osmosis and Acid Regenerant Subsystem (VCO Tank System INTEC-078; SITE TANK-005 Action Plan), a chloride removal system (not included in the VCO), and an ultraviolet light sterilization system (not included in the VCO).

Twelve BWTS units were included in the June 14, 2000, VCO between the State of Idaho Department of Environmental Quality (DEQ) and the U.S. Department of Energy (DOE) (DEQ 2000). Eleven of these 12 VCO units were characterized under the VCO as having managed HWMA/RCRA-hazardous waste. Characterization results from the remaining VCO unit indicate that the waste remaining in the tank is not HWMA/RCRA hazardous. In accordance with further milestones established under the VCO Action Plan, the BWTS units and associated ancillary equipment from each of the action plans identified above that were determined to have managed HWMA/RCRA-hazardous waste will be closed under this closure plan in accordance with the tank system closure performance standards of Idaho Administrative Procedures Act (IDAPA) 58.01.05.009 [40 Code of Federal Regulations [CFR] 265.111 and 265.197(a)].

This HWMA/RCRA closure plan includes a general description of the BWTS (for purposes of this closure plan, the BWTS is defined as those units and associated ancillary equipment included in the VCO), a description of the system components for which decontamination or removal actions will be taken during HWMA/RCRA closure of the system, and specific descriptions of those units characterized as having managed HWMA/RCRA-hazardous waste. The current and maximum hazardous waste inventories are identified in the plan along with the applicable U.S. Environmental Protection Agency (EPA) hazardous waste numbers (HWNs). Closure activities include removal of the current hazardous waste inventory. Following waste inventory removal, the tanks and tank system components that were determined to have managed hazardous waste will either be removed, characterized, and managed based on characterization, or if removal is deemed impractical, decontaminated to the site-specific action levels

a. On February 1, 2005, the Idaho National Engineering and Environmental Laboratory contract divided, forming INL, which implements its continuing research mission, and the Idaho Cleanup Project, which carries out the site's cleanup responsibilities.

(ALs) specified in this closure plan. The BWTS will be considered HWMA/RCRA “clean closed” when the closure activities identified in this plan are complete, as certified by an independent, registered professional engineer (PE) and accepted by the DEQ.

Waste discharge piping from the BWTS to the radioactive solid and liquid waste storage vessel (VES-SFE-106) or the waste collection tank (VES-SFE-126) is not addressed under this closure plan. Piping to VES-SFE-106 will be addressed during interim status closure of VES-SFE-106, which is listed on the RCRA Part A Permit Application for the INL (DOE-ID 2005). Drain piping to VES-SFE-126 has been addressed as part of the HWMA/RCRA less than 90-day generator closure of VES-SFE-126 (INEEL 2000). This closure plan addresses only those units and ancillary equipment included in the VCO (Multi-Media Sand Filtration Subsystem, New and Old Ion Exchange Subsystems, and the Reverse Osmosis and Acid Regenerant Subsystem) that were determined to have managed HWMA/RCRA-hazardous waste. No removal or decontamination activities will be conducted under closure for those VCO units and ancillary equipment that were determined during characterization to have not managed HWMA/RCRA-hazardous waste. Other BWTS units and components not included in the VCO (i.e., chloride removal system and ultraviolet light sterilization system) will not be HWMA/RCRA closed. The chloride removal system was decommissioned and dismantled in 1992 and the ultraviolet light sterilization system never generated, treated, or stored hazardous waste (INEEL 1997; INEL 1993).

Closure activities for the tank system must comply with DOE orders pertaining to radioactive waste management and worker safety in addition to HWMA/RCRA because the BWTS contains mixed waste (both radioactive and hazardous waste per HWMA/RCRA). This plan was developed to address clean closure of the BWTS in compliance with HWMA/RCRA regulations. Residual radioactive contamination will be addressed under a separate regulatory authority.

2. FACILITY DESCRIPTION

2.1 Site Description

The INL Site encompasses approximately 890 square miles on the northern edge of the Eastern Snake River Plain in southeastern Idaho. The INTEC facility is located northeast of the Central Facilities Area at the INL Site. The INTEC facility is situated on the south-central portion of the INL Site (see Figure 2-1) and occupies an enclosed and secured area of approximately 0.39 square miles.

The Basin Facility (Building CPP-603) is located inside INTEC, near the southern perimeter fence (see Figure 2-1). Three underwater storage basins and the associated BWTS, the Fuel Element Cutting Facility, the Irradiated Basin Facility, two transfer stations, crane bays, a transfer canal, and decontamination areas are located within Building CPP-603. The underwater storage basins and transfer canal contain approximately 1.5 million gal of water. All spent nuclear fuel stored in the basins was removed prior to April 28, 2000.

2.2 Basin Water Treatment System Description and Operating History

The CPP-603 Basin Facility contains three separate pools or basins, interconnected by a transfer canal, for underwater storage of spent nuclear fuel (see Figure 2-2). The water in the basins provided radiation shielding and cooling. Water quality was controlled to minimize fuel element corrosion, ensure clarity for proper visibility, and remove radioactive particulates and ions.

The BWTS at Building CPP-603 included the Multi-Media Sand Filtration Subsystem, the Old Ion Exchange Subsystem, the New Ion Exchange Subsystem, the Reverse Osmosis and Acid Regenerant Subsystem, a chloride removal system, and an ultraviolet light sterilization system. This closure plan only addresses those units and ancillary equipment that are part of the Multi-Media Sand Filtration Subsystem, the New and Old Ion Exchange Subsystems, and the Reverse Osmosis and Acid Regenerant Subsystem that were determined to have managed HWMA/RCRA-hazardous waste. The following subsections provide a general description of these subsystems. Subsection 2.3 identifies those VCO units and associated ancillary equipment, which are components of the subsystems described below, that were determined to have managed HWMA/RCRA-hazardous waste and for which removal actions will be taken under closure.

2.2.1 Multi-Media Sand Filtration Subsystem

The Multi-Media Sand Filtration Subsystem was placed in service in 1976 and ceased operation in 1992. The system is comprised of three multi-media sand filters (F-SF-113, 98CPP00610; F-SF-114, 98CPP00611; F-SF-115, 98CPP00612), a filter backwash holding tank (VES-SF-108; 98CPP00619), a clarifier (VES-SF-109; 98CPP00620), and associated pumps, piping, and valves (see Schematic P-CLOS-CCPP-603-BWTS [Figure 2-3]). The sand filters were operated in parallel as a pretreatment step for the ion exchange systems to decrease the chance of entrained particulates fouling or plugging the ion exchange beds and to increase the life of the ion exchange resins.

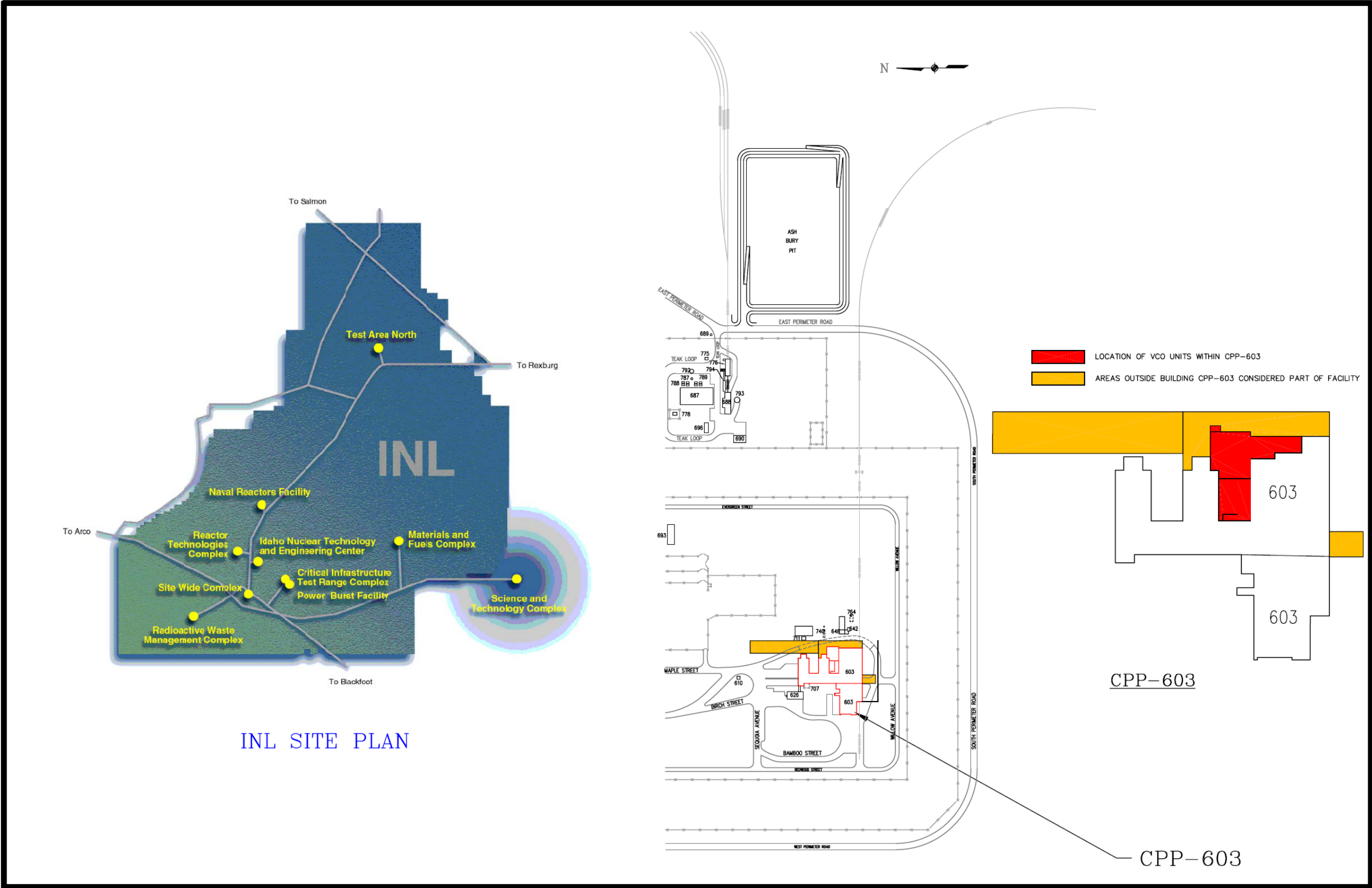


Figure 2-1. Location of VCO BWTS units at INTEC.

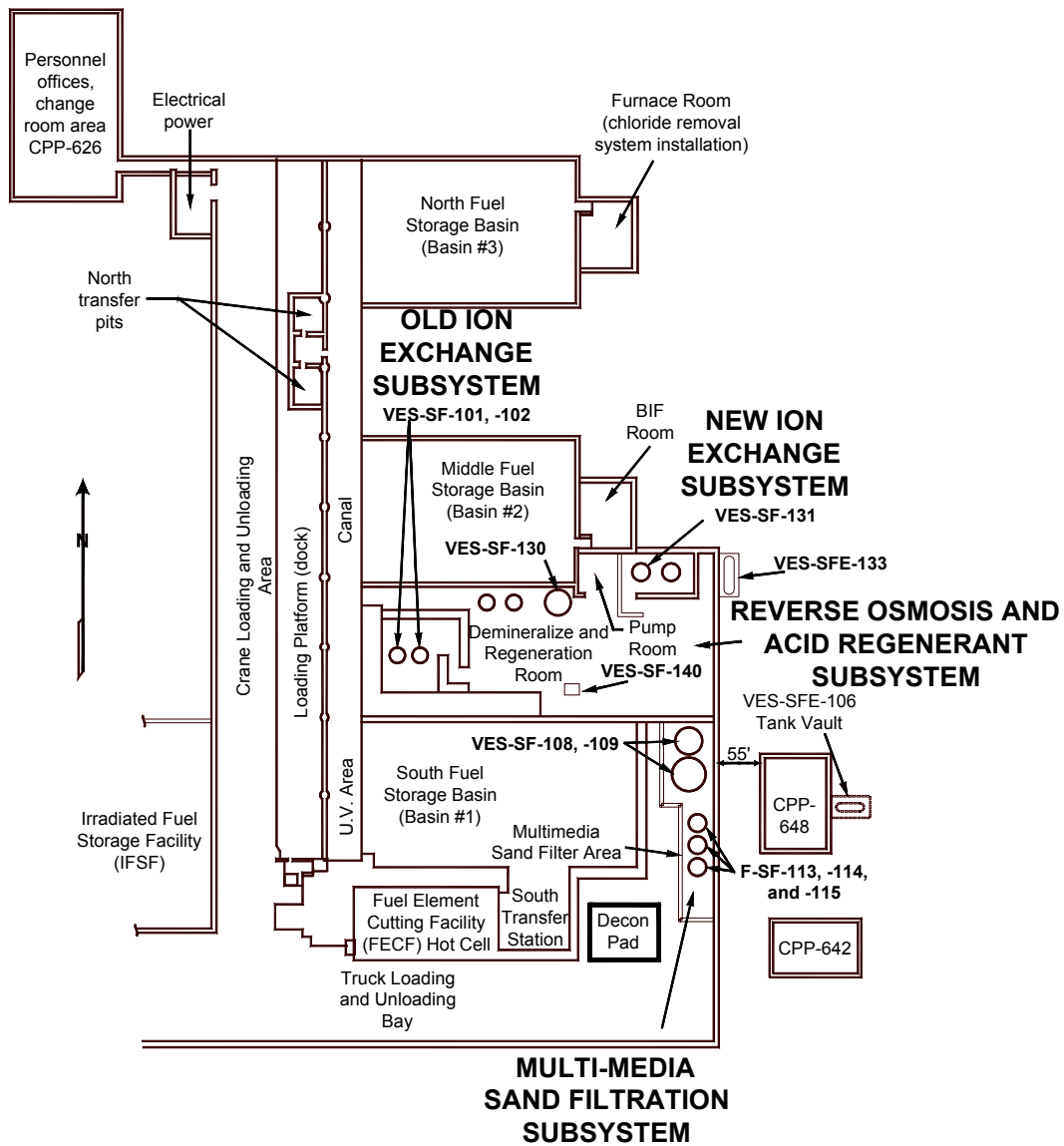


Figure 2-2. Floor plan of CPP-603 showing the location of BWTS units undergoing HWMA/RCRA closure activities.

The sand filters were backwashed manually when the pressure drop across the filter media increased to a predetermined value or when sand filter radiation levels increased. The filters were backwashed using basin water. The backwash water and associated solids were directed from the sand filters to the filter backwash holding tank (VES-SF-108). Liquid and solids were then pumped from the filter backwash holding tank to the clarifier (VES-SF-109). Overflow from the clarifier drained by gravity back to the fuel storage basins. Concentrated solids in the clarifier underflow were intermittently transferred to the radioactive solid and liquid waste storage vessel (VES-SFE-106).

Each sand filter is a vertical, cylindrical tank constructed of epoxy-lined carbon steel. The epoxy liner is integral to the tank. Each filter is 1.8 m (6 ft) in diameter by 1.7 m (5.5 ft) in height with a capacity of 1,163 gal. Each tank contains four layers of filtering/support material. The domed bottom of each sand filter is filled with grout (approximate depth of 25.4 cm [10 in.]) to support the filter media. The bottom layer of filter media consists of a 7.6-cm (3-in.) layer of pea gravel, followed by 12.7 cm (5 in.) of garnet, both serving as support for the two finer layers above. The next layer is composed of finer garnet, and is approximately 45 cm (17.7 in.) in depth. The top layer of filter material is composed of 45 cm (17.7 in.) of 0.7-mm (0.03-in.) anthracite, which was used to remove large solids and prevent filter plugging.

The filter backwash holding tank is a vertical, cylindrical tank that is constructed of carbon steel with a polyvinyl chloride lining that is integral to the tank. This tank has an outside diameter of 3 m (10 ft) and stands 3.8 m (12.6 ft) in height.

The clarifier consists of a vertical, cylindrical upper portion and a conical lower portion. The maximum diameter of the cylindrical portion is 3.7 m (12 ft) by 3.9 m (12.8 ft) in height. The conical section has a pitch of 50°. The clarifier is constructed of carbon steel with polyvinyl chloride lining that is integral to the tank. An overflow weir encircles the upper edge of the tank to collect liquid, which drains by gravity to the fuel storage basins. The inlet from the filter backwash holding tank is positioned in the center of the clarifier on the cylindrical portion. A cylindrical baffle is positioned around the inlet to prevent short-circuiting in the clarifier and increase wastewater residence time. The clarifier is rated at a nominal capacity of 30-gpm inlet flow.

Additional details of the Multi-Media Sand Filtration Subsystem can be found in the system identification document prepared in support of the VCO NEW-CPP-016 Action Plan (INEEL 2002).

2.2.2 New Ion Exchange Subsystem

In 1980, the New Ion Exchange Subsystem was installed to provide additional capacity for the basin water treatment (Exxon Nuclear Idaho Company, Inc. 1979) and includes two ion exchange columns (duolite resin tank [VES-SF-131; 98CPP00632] and zeolon resin tank [VES-SF-132; 98CPP00633]), regenerant makeup tank (VES-SF-130; 98CPP00631), and associated regenerant piping (see Schematic P-CLOS-CPP-603-BWTS [Figure 2-3]). The ion exchange capacity of the Old Ion Exchange Subsystem was determined to be insufficient to reduce the radioactivity of the basin water to acceptable levels. The combined systems (new and old) had the ability to process a volume of water equivalent to the total volume of the basins five or six times each month (INEEL 1997). Basin water was pumped to the New Ion Exchange Subsystem from either the sand filter outlet header or directly from the basins. Under normal operating conditions, water was first filtered through the sand filters before passing through the ion exchange columns, which were operated in series. Basin water exiting the ion exchange vessels was discharged to the basins via the sand filter outlet header (INEEL 1997).

The duolite resin tank contained Duolite 464 resin for strontium-90 removal and was periodically regenerated with a dilute nitric acid solution. This regenerant solution was prepared in the regenerant makeup tank (VES-SF-130) by mixing 13 M nitric acid and demineralized water supplied from the

Reverse Osmosis and Acid Regenerant Subsystem. The regenerant solution was then pumped from the regenerant makeup tank to the ion exchange column. Spent regenerant and rinse solutions drained to the radioactive solid and liquid waste storage vessel (VES-SFE-106) (INEEL 1997). The zeolon resin tank contained Zeolon 900 resin for cesium-137 removal. The resin was not regenerated, but was replaced periodically. Spent resin was slurried and pumped to VES-SFE-106. New Zeolon 900 resin was added to the zeolon resin tank via a resin addition hopper (HO-SF-800), which has been removed (INEEL 1997). The New Ion Exchange Subsystem has been inactive since 1992.

The new ion exchange columns are vertical, cylindrical tanks with domed ends constructed of Type 304L stainless steel. The tanks are 1.7 m (5.5 ft) in outside diameter and 2.5 m (8.1 ft) in height with a capacity of 1,421 gal. The regenerant makeup tank is 2.7 m (9 ft) in diameter and 2.7 m (9 ft) in height with a capacity of 4,282 gal. The tank is constructed of stainless steel.

Additional details of the New Ion Exchange Subsystem can be found in the system identification document prepared in support of the VCO NEW-CPP-016 Action Plan (INEEL 2002).

2.2.3 Old Ion Exchange Subsystem

The Old Ion Exchange Subsystem was installed in 1973 and includes two ion exchange vessels (VES-SF-101, 98CPP00614; VES-SF-102, 98CPP00615) that were operated in series to remove radioactive ions from the basin water and associated piping (see Schematic P-CLOS-CPP-603-BWTS [Figure 2-3]). The Old Ion Exchange Subsystem was designed to treat water discharged from the Multi-Media Sand Filtration Subsystem or water pumped directly from the basins. Treated water from the ion exchange columns was discharged to the middle fuel storage basin and the fuel transfer pits in the north transfer station (INEEL 1997).

Ion exchange vessel VES-SF-101 was designed to remove cesium-137 using an aggregate Zeolon 900 ion exchange resin. The Zeolon 900 resin was designed to be regenerated using solutions of ammonium carbonate or ammonium sulfate (INEL undated); however, the resin was never satisfactorily regenerated and consequently was replaced periodically based on cesium breakthrough data (Exxon Idaho Nuclear Company, Inc. 1979). As a result, no regenerant and no regenerant-related wastewater was produced. Once breakthrough was detected, based on the detection of gamma radioactivity downstream of the ion exchange columns, the resin media were replaced. Filtered basin water was used to fluidize and remove the spent resin that was discharged to the radioactive solid and liquid waste storage vessel (VES-SFE-106).

Ion exchange vessel VES-SF-102 was designed to remove strontium-90 using a bead Amberlite 200 ion exchange resin. The Amberlite 200 resin was designed to be regenerated using a solution of sodium nitrate or nitric acid (Exxon Nuclear Idaho Company, Inc. 1979; INEL undated); however, although the system was designed with the capability, the resins were never regenerated (EDF-2619).

Throughout the operating life of the Old Ion Exchange Subsystem, several different resins were used, based on availability, to remove radionuclides from the basin water. The use of Amberlite 200 resin was phased out and the Zeolon 900 resin was used as the primary resin in both of the old ion exchange vessels until about Calendar Year 1988. At that time, VES-SF-102 was emptied and placed in standby status (EDF-2619); recent video inspection of VES-SF-102 confirmed the ion exchange column was emptied and only residual resin remains. Ion exchange column VES-SF-101 was filled with a PDZ-14010 resin, which was being tested as a replacement for the Zeolon 900 resin that was no longer available, and inert glass beads were added to completely fill the bed.

The old ion exchange vessels are vertical, cylindrical tanks 0.9 m (3 ft) in diameter by 2.4 m (8 ft) in height with a capacity of 423 gal. The vessels are constructed of Type 304 stainless steel with a wall thickness of 3/16 in. (INEL undated). Each vessel was designed to contain a resin bed (1.1 m [3.5 ft] depth; 24 ft³ volume) between an upper and lower screen and associated screen supports. To assist in resin removal, the bottom plate is sloped toward the resin discharge valve (INEEL 1997).

Additional details of the Old Ion Exchange Subsystem can be found in the system identification document prepared in support of the VCO SITE-TANK-005 Action Plan (INEEL 2003).

2.2.4 Reverse Osmosis and Acid Regenerant Subsystem

In 1980, a reverse osmosis system was installed to improve the overall efficiency of the BWTS. Reverse osmosis was used to reduce the dissolved solids content of the raw water makeup to the facility. A slightly acidified raw water stream was supplied to the system. Treated water from the reverse osmosis system was routed to various units in CPP-603 (INEEL 1997, 2003).

The Reverse Osmosis and Acid Regenerant Subsystem includes two nitric acid tanks (VES-SF-140, 98CPP00636; VES-SFE-133, 98CPP00638) that were used to supply nitric acid to the BWTS and associated regenerant supply piping (see Schematic P-CLOS-CPP-603-BWTS [Figure 2-3]). The reverse osmosis acid feed tank (VES-SF-140) was used to automatically adjust the raw water supply to the reverse osmosis filters to a pH of between 4 and 6 to inhibit scale formation using 13 M (60% wt) nitric acid (Exxon Idaho Nuclear Company, Inc. 1979). Acid tank VES-SFE-133 supplied nitric acid to the reverse osmosis acid feed tank and to the regenerant makeup tank (VES-SF-130) for use in regenerating the BWTS ion exchange vessels (INEEL 2003).

Both acid tanks are constructed of stainless steel. The reverse osmosis acid feed tank is 0.4 m (1.3 ft) in diameter and 1.3 m (4.3 ft) in height with a capacity of 30 gal. The VES-SFE-133 acid tank is 1.1 m (3.5 ft) in diameter and 2.2 m (7.2 ft) in length with a capacity of 500 gal.

Additional details of the Reverse Osmosis and Acid Regenerant Subsystem can be found in the system identification document prepared in support of the VCO SITE-TANK-005 Action Plan (INEEL 2003).

2.3 BWTS Subsystem Units and Ancillary Equipment that Managed Hazardous Waste

Characterization of each of the 12 BWTS units included in the VCO NEW-CPP-016 Action Plan and SITE-TANK-005 VCO Tank Systems INTEC-077 and INTEC-078 was completed in accordance with established milestones under the VCO (DEQ 2000).

- Characterization (EDF-2621) of the subsystems included in the VCO NEW-CPP-016 Action Plan (Multi-Media Sand Filtration Subsystem and New Ion Exchange Subsystem) was approved by DEQ on June 15, 2001 (Gregory 2001)
- Characterization (EDF-2619) of the Old Ion Exchange Subsystem (SITE-TANK-005 VCO Tank System INTEC-077) was approved by DEQ on September 13, 2002 (Gregory 2002a)
- Characterization (EDF-2620) of the Reverse Osmosis and Acid Regenerant Subsystem (SITE-TANK-005 VCO Tank System INTEC-078) was approved by DEQ on July 24, 2002 (Gregory 2002b).

The following subsections describe the subsystem units and ancillary equipment for which removal activities will be completed under this HWMA/RCRA closure plan (i.e., those units that were determined during characterization to have managed a HWMA/RCRA-hazardous waste). The units and associated ancillary equipment for which removal activities will be conducted under closure are highlighted in green on Schematic P-CLOS-CPP-603-BWTS (see Figure 2-3).

2.3.1 BWTS Units to be HWMA/RCRA Closed

The following VCO units, which are components of the BWTS, were determined to have managed HWMA/RCRA-hazardous waste and are subject to removal under this HWMA/RCRA closure plan. Should removal be determined to be impractical, the units will be decontaminated as described in Section 5 of this closure plan.

2.3.1.1 VCO NEW-CPP-016 Action Plan Units.

- F-SF-113 Multi-Media Sand Filter (Multi-Media Sand Filtration Subsystem)
- F-SF-114 Multi-Media Sand Filter (Multi-Media Sand Filtration Subsystem)
- F-SF-115 Multi-Media Sand Filter (Multi-Media Sand Filtration Subsystem)
- VES-SF-108 Filter Backwash Holding Tank and High-Efficiency Particulate Air (HEPA) Filter F-SF-117 (Multi-Media Sand Filtration Subsystem)
- VES-SF-109 Clarifier (Multi-Media Sand Filtration Subsystem)
- VES-SF-130 Regenerant Makeup Tank (New Ion Exchange Subsystem)
- VES-SF-131 Duolite Resin Tank (New Ion Exchange Subsystem).

The zeolon resin tank (VES-SF-132), which is part of the New Ion Exchange Subsystem, is an inactive process/product unit that was characterized as not having managed HWMA/RCRA-hazardous waste; therefore, additional decontamination and/or removal activities for this unit will not be conducted under closure.

2.3.1.2 VCO SITE TANK-005 Action Plan Units.

- VES-SF-101 Ion Exchange Column (Old Ion Exchange Subsystem; VCO Tank System INTEC-077)
- VES-SF-102 Ion Exchange Column (Old Ion Exchange Subsystem; VCO Tank System INTEC-077)
- VES-SF-140 Reverse Osmosis Acid Feed Tank (Reverse Osmosis and Acid Regenerant Subsystem; VCO Tank System INTEC-078)
- VES-SFE-133 Portable Acid Tank (Reverse Osmosis and Acid Regenerant Subsystem; VCO Tank System INTEC-078).

2.3.2 BWTS Piping and Ancillary Equipment to be HWMA/RCRA Closed

Some BWTS lines and components will not be removed or decontaminated as part of BWTS closure activities. During operation, they managed only nonhazardous basin water or they transported treated basin water. During characterization, these lines and components were determined to have not managed HWMA/RCRA-hazardous waste (EDF-2619; EDF-2621). No removal or decontamination activities will be conducted for air supply lines, instrument lines, raw water lines, or makeup water lines, as these lines also did not manage HWMA/RCRA-hazardous waste.

Removal and/or decontamination activities for waste discharge piping from the BWTS components to the radioactive solid and liquid waste storage vessel (VES-SFE-106) or to the waste collection tank (VES-SFE-126) will not be conducted as part of closure of the BWTS, as they are considered ancillary to the tank system to which they discharged (i.e., VES-SFE-106 or VES-SFE-126). These lines and associated ancillary equipment will be addressed during HWMA/RCRA closure of VES-SFE-106, an HWMA/RCRA interim status unit, or have been addressed during the HWMA/RCRA less than 90-day generator closure of VES-SFE-126 (INEEL 2000).

Removal activities will be conducted under this HWMA/RCRA closure plan for the subsystem piping and ancillary equipment, as defined in the following subsections and shown on Schematic P-CLOS-CPP-603-BWTS (see Figure 2-3). A summary of each piece of ancillary equipment for which removal actions will be taken during closure is presented in Table 2-1. Should removal be determined to be impractical, the ancillary equipment will be decontaminated as described in Section 5 of this closure plan.

Table 2-1. Ancillary equipment to be removed during closure of the BWTS.

Equipment No.	Origin	Terminus	Approx. Length	Original Contents
6" PSN-101202	Multi-Media Sand Filters	VES-SF-108	60 ft	Sand filter backwash
2" HAN-101215	Valve V-30 located upstream of VES-SF-108	VES-SF-108	2 ft	Air
1 1/2" PSN-101211	VES-SF-108	Pumps P-SF-216 and -217	12 ft	Sand filter backwash
2" PSN-101212	Pumps P-SF-216 and -217	VES-SF-109	30 ft	Sand filter backwash
2" PSA-110473	Line 2" PSN-101212	Blind flanged	20 ft	Sand filter backwash
Pump P-SF-216	N/A	N/A	N/A	Sand filter backwash
Pump P-SF-217	N/A	N/A	N/A	Sand filter backwash
HEPA Filter F-SF-117	N/A	N/A	N/A	Vessel off-gas
3" PSA-105574 (upstream of valve HCV-3)	3" PSA-105570	Valve HCV-3	5 ft	Regenerant makeup
3" PSA-105572 (upstream of valve HCV-4)	3" PSA-105570	Valve HCV-4	40 ft	Regenerant makeup

Table 2-1. (continued).

Equipment No.	Origin	Terminus	Approx. Length	Original Contents
3" PSA-105573 (upstream of valve HCV-1)	3" PSA-105570	Valve HCV-1	8 ft	Regenerant makeup
3" PSA-105571 (upstream of valve HCV-2)	3" PSA-105570	Valve HCV-2	25 ft	Regenerant makeup
3" PSA-105570	Pump P-SF-230	3" PSA-105573	22 ft	Regenerant makeup
2" PSA-106398	3" PSA-105570	Check valve located upstream of tie-in with 2" BWA-100274	50 ft	Regenerant makeup
3" PSA-105575	3" PSA-105570	VES-SF-130	15 ft	Regenerant makeup
3" PLA-105576	VES-SF-130	Sample station sink	15 ft	Regenerant makeup
2" PLA-105592	VES-SF-130	Floor drain	15 ft	Regenerant makeup
4" PSA-105570	VES-SF-130	Pump P-SF-230	20 ft	Regenerant makeup
Sample station sink discharge line	Sample station sink	Floor drain	3 ft	Regenerant makeup
Strainer discharge line	4" PSA-105570 strainer	Floor drain	6 ft	Regenerant makeup
Pump P-SF-230	N/A	N/A	N/A	Regenerant makeup
Sample station sink	N/A	N/A	N/A	Sample solutions
1" NAA-106397	Pump P-SFE-233	VES-SF-130	73 ft	Nitric acid
Acid tank discharge line	VES-SFE-133	Pump P-SFE-233	N/A ^a	Nitric acid
1/2" NA-AR-152514	1" NAA-106397	VES-SF-140	21.5 ft	Nitric acid
1/4" NA-AR-152941	1/4" NA-AR-152940	1/4" NA-AR-152940	4 ft	Nitric acid
1/4" NA-AR-152940	VES-SF-140	1 1/2" RWP-106400	6 ft	Nitric acid
Pump P-SFE-233	N/A	N/A	N/A	Nitric acid
Pump P-SFE-240	N/A	N/A	N/A	Nitric acid
Filter FI-SF-140	N/A	N/A	N/A	Nitric acid

N/A = Not available.
a. Pump is attached directly to flange.

2.3.2.1 Multi-Media Sand Filtration Subsystem. The sand filter backwash lines (6" PSN-101202, 1 1/2" PSN-101211, 2" PSA-110473, and 2" PSN-101212) and associated ancillary equipment (pumps P-SF-216 and P-SF-217), which were used to transfer backwash solution from the sand filters to the filter backwash holding tank and the clarifier, will be removed during closure of the BWTS. Air supply line 2" HAN-101215 to the filter backwash holding tank will be removed during closure from check valve V-30 to the tank as this portion of the line would have managed backwash solutions when the tank was not being air sparged.

2.3.2.2 New Ion Exchange Subsystem. Although it is not expected that nitric acid remains in the acid regenerant lines, these lines will be addressed during HWMA/RCRA closure of the BWTS, as follows (see Schematic P-CLOS-CPP-603-BWTS [Figure 2-3]):

- Regenerant feed line 3" PSA-105572 will be removed to valve HCV-4 during HWMA/RCRA closure of the BWTS because this line managed product material that would have been characterized as characteristically hazardous for corrosivity upon becoming a waste. Downstream of this valve, which was normally in the closed position, the product nitric acid was mixed with basin water when the system was pressurized. Any residual liquids that may remain in this short piping segment (1–2 ft) downstream of valve HCV-4 would not exhibit the characteristic of corrosivity. Therefore, no closure activities will be taken on line 3" PSA-105572 downstream of valve HCV-4.
- Regenerant feed line 3" PSA-105574 will be removed to valve HCV-3 during HWMA/RCRA closure of the BWTS because this line managed product material that would have been characterized as characteristically hazardous for corrosivity upon becoming a waste. Downstream of this valve, which was normally in the closed position, the product nitric acid was mixed with basin water when the system was pressurized. Any residual liquids that may remain in this short piping segment (1–2 ft) downstream of valve HCV-3 would not exhibit the characteristic of corrosivity. Therefore, no closure activities will be taken on line 3" PSA-105574 downstream of valve HCV-3.
- Regenerant feed line 3" PSA-105571 will be removed to valve HCV-2 during HWMA/RCRA closure of the BWTS because this line managed product material that would have been characterized as characteristically hazardous for corrosivity upon becoming a waste. Downstream of this valve, which was normally in the closed position, the product nitric acid was mixed with basin water when the system was pressurized. Any residual liquids that may remain in this short piping segment (2–3 ft) downstream of valve HCV-2 would not exhibit the characteristic of corrosivity. Therefore, no closure activities will be taken on line 3" PSA-105571 downstream of valve HCV-2.
- Regenerant feed line 3" PSA-105573 will be removed to valve HCV-1 during HWMA/RCRA closure of the BWTS because this line managed product material that would have been characterized as characteristically hazardous for corrosivity upon becoming a waste. Downstream of this valve, which was normally in the closed position, the product nitric acid was mixed with basin water when the system was pressurized. Any residual liquids that may remain in this short piping segment (2–3 ft) downstream of valve HCV-1 would not exhibit the characteristic of corrosivity. Additionally, the zeolon resin in VES-SF-132 was not regenerated. Therefore, no closure activities will be taken on line 3" PSA-105573 downstream of valve HCV-1.
- Regenerant piping and ancillary equipment (4" PSA-105570, pump P-SF-230, 3" PSA-105570, 3" PSA-105575, and 3" PLA-105576) from the regenerant makeup tank will be removed in its entirety during HWMA/RCRA closure of the BWTS.
- Regenerant feed line 2" PSA-106398 to the Old Ion Exchange Subsystem will be removed during HWMA/RCRA closure of the BWTS to the check valve immediately upstream of the tie-in with lines 2" BWA-100274 and 2" PSA-106398. As the old ion exchange columns were never regenerated (EDF-2619), regenerant piping ancillary to the old ion exchange columns only managed nonhazardous basin water (EDF-2619; EDF-2621).

- Waste discharge piping and ancillary equipment from the regenerant makeup tank and sample station sink (2" PLA-105592, the strainer discharge line, and the sample station sink) will be removed during HWMA/RCRA closure of the BWTS to the point where it discharges to the associated floor drain. The drain and associated piping are ancillary to VES-SFE-126 and have been addressed during the HWMA/RCRA less than 90-day generator closure of VES-SFE-126 (INEEL 2000).

2.3.2.3 Old Ion Exchange Subsystem. All process piping associated with the Old Ion Exchange Subsystem only managed nonhazardous basin water (EDF-2619; EDF-2621), as regeneration of the ion exchange columns with nitric acid from the regenerant makeup tank (VES-SF-130) never occurred (EDF-2619). Therefore, no removal or decontamination activities will be conducted for this piping during HWMA/RCRA closure of the BWTS.

2.3.2.4 Reverse Osmosis and Acid Regenerant Subsystem. Although it is not expected that nitric acid remains in the acid regenerant lines, all piping and ancillary equipment used to transfer bulk nitric acid from acid tank VES-SFE-133 to the reverse osmosis acid feed tank (VES-SF-140) and the regenerant makeup tank (VES-SF-130) will be removed during HWMA/RCRA closure of the BWTS. Discharge piping (1/4" NA-AR-152940 and 1/4" NA-AR-152941) and ancillary equipment from the reverse osmosis acid feed tank will be removed to the point it connects with the raw water input to the Reverse Osmosis and Acid Regenerant Subsystem (Line 1 1/2" RWP-106400). Downstream piping from this connection did not manage HWMA/RCRA-hazardous waste.

3. BASIN WATER TREATMENT SYSTEM CURRENT AND MAXIMUM WASTE INVENTORIES AND CHARACTERISTICS

3.1 Current Hazardous Waste Inventory

The BWTS units currently contain the hazardous waste inventory as specified in Table 3-1. The current waste inventory (consisting primarily of dewatered solids) is approximately 2,825 gal. The waste inventory (solids) remaining in the sand filters (sand filter media) and ion exchange columns VES-SF-131, VES-SF-101, and VES-SF-102 (ion exchange media) was characterized as HWMA/RCRA hazardous for cadmium (EPA HWN D006) (EDF-2619; EDF-2621). Residual liquid (basin water) that may be contained within these units was characterized as nonhazardous (EDF-2619; EDF-2621).

The solids in the filter backwash holding tank and the solids and liquids in the clarifier were characterized as HWMA/RCRA hazardous for cadmium (EPA HWN D006). The regenerant makeup tank (VES-SF-130) was characterized for corrosivity (EPA HWN D002). The portable acid tank (VES-SFE-133) and the reverse osmosis acid feed tank (VES-SF-140) currently contain nitric acid residues that were characterized as characteristically hazardous for chromium (EPA HWN D007) and for corrosivity (EPA HWN D002) (EDF-2620; EDF-2621).

The HWMA/RCRA contaminants of concern based on analytical data from characterization of the VCO units, as described above, and historical sampling results from VES-SFE-106 (all constituents detected during analysis), are 2-butanone, 4-methyl-2-pentanone, aluminum, antimony, arsenic, barium, beryllium, cadmium, chromium, lead, mercury, nickel, selenium, silver, thallium, toluene, vanadium, and zinc.

3.2 Maximum Hazardous Waste Inventory

Based on total tank capacity, the maximum capacity of the tanks that managed HWMA/RCRA-hazardous waste is approximately 22,268 gal. Table 3-1 provides a description of the tanks that were determined to have managed HWMA/RCRA-hazardous waste as well as the maximum waste inventory and the nature of the waste managed.

Table 3-1. Description and status of tanks included in the BWTS HWMA/RCRA closure.

Tank Number	Description	Dimensions	Maximum Waste Inventory ^a	Current Waste Inventory ^b	Hazardous Waste Inventory	Applicable HWN
F-SF-113	Multi-Media Sand Filter	1.8 m (6 ft) diameter × 1.7 m (5.5 ft) height	1,163	500	Filter media and sludge	D006 (cadmium)
F-SF-114	Multi-Media Sand Filter	1.8 m (6 ft) diameter × 1.7 m (5.5 ft) height	1,163	500	Filter media and sludge	D006 (cadmium)
F-SF-115	Multi-Media Sand Filter	1.8 m (6 ft) diameter × 1.7 m (5.5 ft) height	1,163	500	Filter media and sludge	D006 (cadmium)
VES-SF-108	Filter Backwash Holding Tank	3 m (10 ft) diameter × 3.8 m (12.6 ft) height	6,500	325	Sand filter backwash solids	D006 (cadmium)
VES-SF-109	Clarifier	3.7 m (12 ft) max diameter × 3.9 m (12.8 ft) overall height	5,200	100	Sand filter backwash solids/liquids	D006 (cadmium)
VES-SF-131	Duolite Resin Tank	1.7 m (5.5 ft) diameter × 2.5 m (8.1 ft) height	1,421	700	Duolite 464 resin	D006 (cadmium)
VES-SF-101	Ion Exchange Column	0.9 m (3 ft) diameter × 2.4 m (8 ft) height	423	200	PDZ-14010 resin	D006 (cadmium)
VES-SF-102	Ion Exchange Column	0.9 m (3 ft) diameter × 2.4 m (8 ft) height	423	Residual	Zeolon 900 resin	D006 (cadmium)
VES-SF-130	Regenerant Makeup Tank	2.74 m (9 ft) diameter × 2.74 m (9 ft) height	4,282	Residual	Nitric acid	D002 (corrosivity)
VES-SFE-133	Portable Acid Tank	1.1 m (3.5 ft) diameter × 2.2 m (7.2 ft) length	500	Residual	Nitric acid	D002 (corrosivity) D007 (chromium)
VES-SF-140	Reverse Osmosis Acid Feed Tank	0.4 m (1.3 ft) diameter × 1.3 m (4.3 ft) height	30	Residual	Nitric acid	D002 (corrosivity) D007 (chromium)

a. Maximum capacity in gallons.
b. Approximate dewatered solids in gallons.

4. CLOSURE PERFORMANCE STANDARDS

This section describes the performance standards for “clean closure” of the BWTS (IDAPA 58.01.05.009 [40 CFR 265.111 and 265.197]) and the procedures for meeting the closure performance standards.

4.1 Regulatory Closure Performance Standards

The closure performance standards identified in IDAPA 58.01.05.009 (40 CFR 265.111 and 265.197) applicable to the BWTS tank system closure are:

- Minimizing the need for further maintenance (IDAPA 58.01.05.009 [40 CFR 265.111(a)])
- Controlling, minimizing, or eliminating the post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated run-off, or hazardous waste decomposition products to the ground or surface waters or to the atmosphere (IDAPA 58.01.05.009 [40 CFR 265.111(b)])
- Removing or decontaminating all waste residues, contaminated containment system components (liners, etc.), contaminated soils, and structures and equipment contaminated with waste, and properly managing all hazardous wastes generated during closure activities (IDAPA 58.01.05.009 [40 CFR 265.197(a)]).

4.2 Procedures for Achieving the Closure Performance Standards

The closure and waste management activities to be conducted under HWMA/RCRA closure are described in detail in Section 5 of this closure plan for each of the subsystems undergoing closure. The closure performance standards will be achieved by the following measures:

- Standard 1: The owner or operator must close the facility in a manner that minimizes the need for further maintenance (IDAPA 58.01.05.009 [40 CFR 265.111(a)]).
 1. The current hazardous waste inventory will be removed and disposed of.
 2. Tanks and system components undergoing HWMA/RCRA closure activities will either be removed and disposed of or, if removal is deemed impractical, decontaminated to the ALs specified in this HWMA/RCRA closure plan.
 3. The tank system will be physically isolated from other systems in Building CPP-603.
- Standard 2: The owner or operator must close the facility in a manner that controls, minimizes or eliminates to the extent necessary to protect human health and the environment, post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated run-off, or hazardous waste decomposition products to the ground or surface waters or to the atmosphere (IDAPA 58.01.05.009 [40 CFR 265.111(b)]).
 1. The current hazardous waste inventory will be removed and disposed of.
 2. Tanks and system components undergoing HWMA/RCRA closure activities will either be removed and disposed of or, if removal is deemed impractical, decontaminated to the ALs specified in this HWMA/RCRA closure plan.

3. The tank system will be physically isolated from other systems in Building CPP-603.
- Standard 3: At closure of a tank system, the owner or operator must remove or decontaminate all waste residues, contaminated containment system components (liners, etc.), contaminated soils, and structures and equipment contaminated with waste, and manage them as hazardous waste, unless §261.3(d) of this Chapter (CFR Title 40) applies. The closure plan, closure activities, cost estimates for closure, and financial responsibility for the tank systems must meet all of the requirements specified in subparts G and H of this part (IDAPA 58.01.05.009 [40 CFR 265.197(a)]).
1. The current hazardous waste inventory will be removed and disposed of.
 2. Tanks and system components undergoing HWMA/RCRA closure activities will either be removed and disposed of or, if removal is deemed impractical, decontaminated to the ALs specified in this HWMA/RCRA closure plan.
 3. Visible waste-related staining in the lined-areas (i.e., New and Old Ion Exchange Cubicles, Acid Regenerant Area) will be removed.
 4. Dust and debris on the floor of the sand filter area will be removed and residual staining, if any, sampled and decontaminated to the ALs specified in this HWMA/RCRA closure plan, as necessary.
 5. All system components undergoing HWMA/RCRA closure are located within Building CPP-603, with the exception of acid tank VES-SFE-133, which is located outside next to Building CPP-603, east of the new and old ion exchange cubicles. The soils beneath the containment for VES-SFE-133 will be sampled for HWMA/RCRA constituents during closure. No additional soils will be evaluated as part of closure.

With the exception of acid tank VES-SFE-133, the BWTS units and components are located inside Building CPP-603 with adequate roof and walls. Therefore, no actions with regard to potentially contaminated soils will be taken during HWMA/RCRA closure of the BWTS for units other than VES-SFE-133. Analytical data obtained from sampling of soils associated with VES-SFE-133 will be provided to the Idaho Cleanup Project (ICP) Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (42 USC 9601 et seq. 1980) Program for evaluation during future CERCLA remedial actions. Soils under and around Building CPP-603 are addressed under the Federal Facility Agreement and Consent Order (FFA/CO) (DOE-ID 1991) as follows:

- Several FFA/CO Group 3, “Other Surface Soils,” sites are co-located in the immediate area of the BWTS. The Group 3 sites consist of soil contamination that resulted from inadvertent spills and leaks of radioactive waste, decontamination solutions, spent fuel storage water, storage of radionuclide-contaminated equipment, and other plant-generated wastewaters (DOE-ID 1999). The selected remedy in the Operable Unit 3-13 Final Record of Decision (DOE-ID 1999) is to excavate the contaminated surface soils and backfill the excavation with sufficient clean soil to reduce the risk from external radiation exposure to $<1 \times 10^{-4}$. Excavated soils will be disposed of in the Idaho CERCLA Disposal Facility.
- FFA/CO Group 3, “Soils Under Buildings and Structures,” Site CPP-02 is an old french drain that was abandoned and partially excavated in 1966 that is located beneath Building CPP-603. The selected remedy in the Operable Unit 3-13 record of decision is implementation of institutional controls with containment. Upon completion of decontamination and decommissioning activities, an evaluation will be performed by the agencies to determine if the soils contain contaminants

exceeding the ALs specified in the record of decision. If these ALs are exceeded, then the Agencies will either cap these soils in place in compliance with the substantive requirement of the hazardous waste landfill closure requirements or excavate and manage the soils as a Group 3 soil (DOE-ID 1999).

With the exception of the sand filter area, each of the BWTS components is located in an area with a liner or an epoxy-coated floor (e.g., ion exchange columns are located in stainless steel-lined cubicles). The containment structure (floor) of the sand filter area, however, is composed of painted concrete. The sand filter area will be managed differently than the lined areas of Building CPP-603. The sand filter area is a high-radiation area and routine/prolonged access to the area is not practical at this time. The entire area is surrounded by shielding walls to limit worker exposure to radiation. As such, access into the sand filter area cannot currently be gained to determine the exact extent of possible waste-related staining on the floor. Additionally, the extent that the staining may be removed via decontamination activities cannot be fully determined prior to access.

5. CLOSURE ACTIVITIES

This closure plan describes the methods for “clean closing” the BWTS per the requirements of IDAPA 58.01.05.009 (40 CFR 265, Subparts G and J). The BWTS will be closed based on closure activities previously completed, removal and disposition of BWTS units and components, and rinsate sample results from decontamination of the BWTS units and components that are decontaminated in lieu of removal. The following subsections describe the closure activities to be completed for each subsystem undergoing HWMA/RCRA closure, waste management activities, and required closure documentation to ensure the tank system closure performance standards (see Subsection 4.1) are satisfied.

The tanks, ancillary equipment, and piping associated with the CPP-603 BWTS are to be closed under HWMA/RCRA by removal of the tanks and ancillary equipment and piping or by decontamination if removal is determined to be impractical. Compliance with the performance standards for the BWTS units and components that will be decontaminated in lieu of removal will be demonstrated by sampling the final rinsate solutions from the decontamination efforts and comparing the resulting analytical data with the site-specific ALs provided in Table 5-1. These ALs were developed to ensure that the tanks, piping, and ancillary equipment, subsequent to completion of closure activities, will be left in a state that is protective of human health and the environment. All rinsate sampling will be conducted in accordance with the *Quality Assurance Project Plan for the HWMA/RCRA Closure Certification of the Basin Facility Basin Water Treatment System Voluntary Consent Order NEW-CPP-016 Action Plan* (INEEL 2007a) and *Field Sampling Plan for the HWMA/RCRA Closure Certification of the Basin Facility Basin Water Treatment System Voluntary Consent Order NEW-CPP-016 Action Plan* (INEEL 2007b).

All units will be decontaminated using water. Water is the medium through which the hazardous constituents, in the form of sludge solids, were transferred to the units being closed. The decontamination system is designed to provide high-pressure water to the units being decontaminated, thus washing and mobilizing residual hazardous solids remaining within the units.

Table 5-1. Contaminant of concern-specific action levels for closure of the BWTS.

Contaminant of Concern	Action Level (mg/L)	Contaminant of Concern	Action Level (mg/L)
2-Butanone	1.7E+02	Lead	4.0E+00
4-Methyl-2-pentanone	2.8E+03	Mercury	1.6E-01
Aluminium	9.9E+04	Nickel	2.4E+03
Antimony	4.8E+01	Selenium	7.8E-01
Arsenic	1.6E+00	Silver	4.0E+00
Barium	8.0E+01	Thallium	7.9E+00
Beryllium	1.2E+02	Toluene	5.0E+02
Cadmium	8.0E-01	Vanadium	8.4E+02
Chromium	3.5E+00	Zinc	3.6E+04

5.1 Closure Activities for the Multi-Media Sand Filtration Subsystem

5.1.1 Removal of Hazardous Waste Inventory

The filter media (layers of anthracite, fine sand, coarse sand, and pea gravel) will be removed from the multi-media sand filters (F-SF-113, -114, and -115) through mobilization and pumping of the filter media using a system specifically designed and tested for waste removal and decontamination of the BWTS (see Figure 5-1). The following process will be used to remove the filter media from the sand filters:

1. A spray nozzle will be inserted into the sand filter
2. Pressurized water will be sprayed into the sand filter to fluidize the filter media
3. A pump will be used to remove the fluidized filter media
4. Waste will be pumped into a high-integrity container (HIC) or other appropriate waste container that is equipped to dewater the collected waste
5. Clarified liquids will be pumped from the waste container to a portable storage tank for temporary storage and sampling prior to disposal
6. The dewatered solids in the waste container will be stabilized (grouted) prior to disposal.

Waste removal under closure will begin when pressurized water is added to the units. Each of the sand filters was constructed such that the bottom dome is filled with concrete to provide a stable base for the filter media. The concrete will be removed from the sand filters using more aggressive methods. The hazardous waste inventory in the multi-media sand filtration units will be considered removed upon completion of the above procedures.

The hazardous waste inventory remaining in the filter backwash holding tank (VES-SF-108) and the clarifier (VES-SF-109) will be pumped to a waste container, equipped to dewater the collected waste, as shown in Figure 5-1. Clarified liquids will be pumped from the waste container to a portable storage tank for temporary storage and sampling prior to disposal; dewatered solids in the waste container will be stabilized (grouted) prior to disposal.

Following waste removal, the VCO units will be visually inspected to ensure that hazardous waste has been removed. Normal scaling associated with liquid waste systems and residual staining may be present. Small amounts of residue and particles may also be present. Should it be determined, based on the inspection, that the hazardous waste inventory has not been removed from the unit, more aggressive removal methods may be employed or the units removed with the residual waste inventory in place and managed in accordance with Section 5.

5.1.2 Removal and/or Decontamination of Tank System Components

The preferred closure approach for all tank system components is complete removal. Following hazardous waste removal, the multi-media sand filters (F-SF-113, -114, and -115) and the filter backwash holding tank (VES-SF-108) will be removed. The units will be removed, sized as necessary, and placed in U.S. Department of Transportation (DOT)-approved waste shipping containers for transportation and subsequent disposal.

BWTS WASTE REMOVAL AND DECONTAMINATION SYSTEM

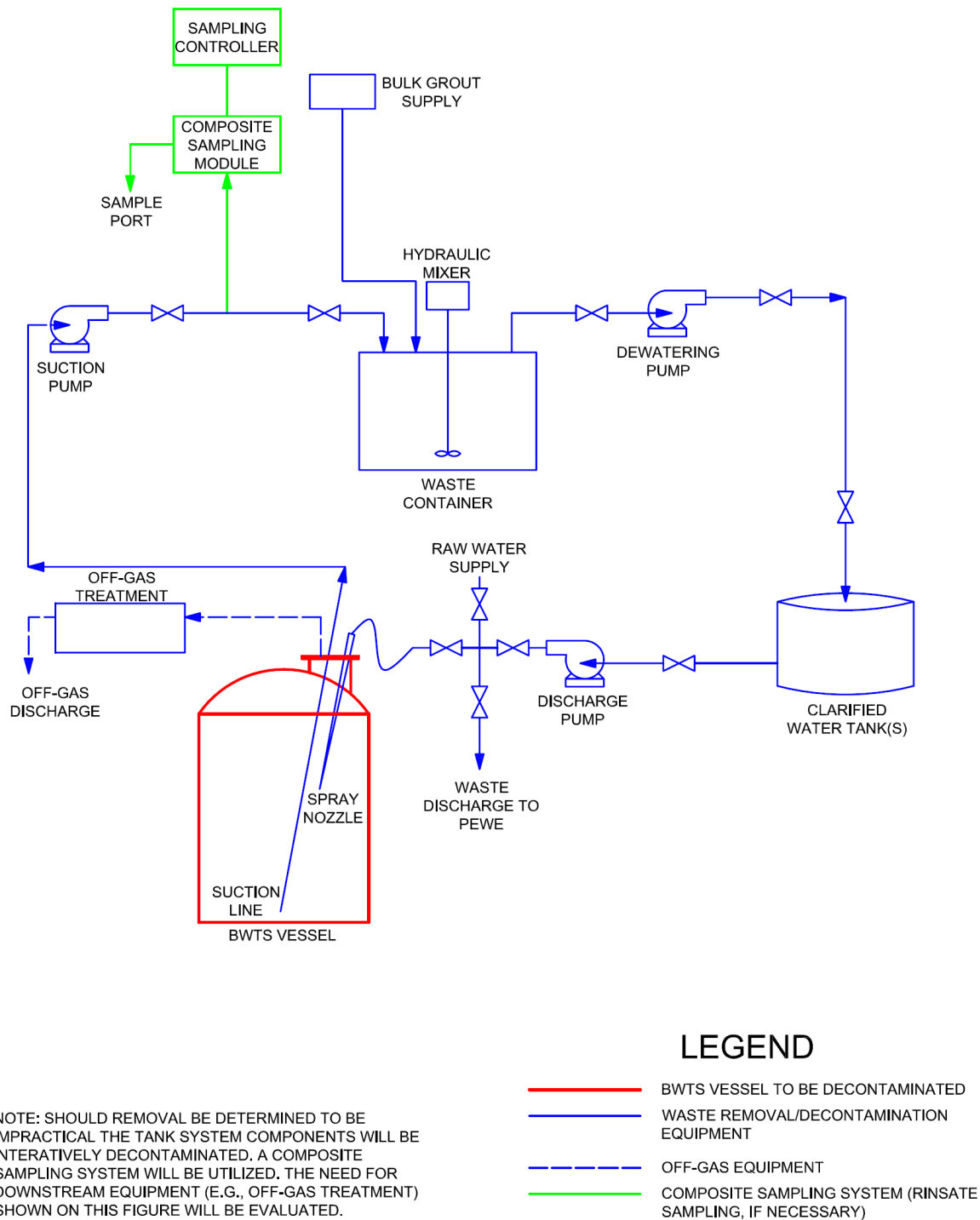


Figure 5-1. Waste removal and decontamination system to be used during BWTS closure.

Should removal be determined to be impractical, the units will be iteratively decontaminated with water using the system described in Subsection 5.1.1 and shown on Figure 5-1. The spray nozzle will be used to introduce decontamination solution (water) to each of the units such that all interior surfaces of the unit being decontaminated are contacted by the decontamination solution. Rinsate solutions will be pumped from the unit being decontaminated to a waste container for temporary storage.

The rinsate will be sampled using a composite sampler built into the decontamination system to ensure that the closure ALs specified in Table 5-1 of this closure plan are met for each unit being decontaminated.

The clarifier (VES-SF-109) is a large, open-top vessel and the internal tank surfaces are accessible; therefore, should removal be determined impractical a high-pressure water spray will not be employed. Instead, the internal tank surfaces will be scrubbed using long-handled mops and brushes, and then rinsed with water. Following decontamination, the decontamination solution will be pumped to a waste container for temporary storage. Rinsate samples will be collected to ensure that the closure ALs specified in Table 5-1 of this closure plan are met for each unit decontaminated.

Following decontamination a second visual inspection may be conducted, as determined necessary.

Interconnecting piping and ancillary equipment used to transfer backwash solutions from the sand filters to the backwash holding tank and clarifier, as identified in Table 2-1 and shown on Schematic P-CLOS-CPP-603-BWTS (Figure 2-3), will be removed and disposed of as mixed HWMA/RCRA-contaminated debris. The piping and associated ancillary equipment will be removed, sized as necessary, and placed in DOT-approved waste shipping containers for transportation and subsequent disposal. The HEPA filter F-SF-117 will be removed and disposed of as mixed HWMA/RCRA-contaminated debris.

5.1.3 Decontamination of Secondary Containment Structures

The floor of the sand filter area is covered in a thin layer (<1/8 in.) of dirt/dust and miscellaneous debris. Based on video of the area, it appears that there is staining of the painted concrete surface in several locations, including the area around the transfer pumps (northwest corner of the sand filter area), along the west wall where the inlet piping for the filters passes through the wall (southwest portion of the sand filter area), and the southern portion of the sand filter area near sand filters F-SF-114 and -115 (believed to be the result of leaks from an abandoned steam condensate tank). The following steps will ensure protection of human health and the environment:

1. Dust and miscellaneous debris will be removed from all accessible areas of the sand filter floor
2. Staining on the sand filter floor will be sampled in accordance with the provisions of the quality assurance project plan (INEEL 2007a) and field sampling plan (INEEL 2007b) and further decontamination conducted, as necessary.

Dust and miscellaneous debris will be removed from all accessible areas of the sand filter floor using a HEPA vacuum or by other physical techniques, as appropriate. Following removal of dust and miscellaneous debris, stained areas of the floor will be identified. Four square feet of the stained surface associated with each unit(s) within the sand filter area (i.e., three separate areas: sand filters, clarifier, and backwash holding tank) will be mopped and the mop water sampled to determine if the actions levels specified in Table 5-1 are met. Areas within the sand filter area have been segregated based on the type of waste managed by each of the units. The following actions will be taken based on the analytical results obtained from the sampling activities:

- If the mean contaminant of concern concentration (as estimated by the 95% upper confidence level) of the mop water for a given stained area exceeds the ALs presented in Table 5-1, then the stained area will be evaluated for non-surficial cracks. If non-surficial cracks are present this plan will be amended in accordance with Section 7 to address potentially contaminated concrete. If non-surficial cracks are not present then the area will be further decontaminated and the area resampled.
- If the mean contaminant of concern concentration (as estimated by the 95% upper confidence level) of the decontamination solution satisfies the ALs presented in Table 5-1, no further closure activities will be conducted for the staining within the area being evaluated
- If the mean contaminant of concern concentration (as estimated by the 95% upper confidence level) of the mop water for a given stained area exceeds the ALs presented in Table 5-1 and the stained area extends to an area that is inaccessible for evaluation of non-surficial cracking and further decontamination, then this closure plan will be amended in accordance with Section 7 to address the inaccessible area.

Wastes generated during decontamination of secondary containment surfaces will undergo a hazardous waste determination (HWD) and will be managed based on that HWD.

5.1.4 Tank System Isolation

Should complete removal of the Multi-Media Sand Filtration Subsystem be determined to be impractical, system components that are not removed will be isolated by cutting and capping all tank inputs and outputs (e.g., air supplies and raw water supplies). The floor drain associated with the Multi-Media Sand Filtration Subsystem, which is ancillary to VES-SFE-106, will be plugged during isolation of the tank system.

5.2 Closure Activities for the New Ion Exchange Subsystem

5.2.1 Removal of Hazardous Waste Inventory

Waste (resin) will be removed from the duolite resin tank (VES-SF-131) using the waste removal and decontamination system described in Subsections 5.1.1 and 5.1.2. Initially, clarified water from the waste container may be returned to the tank through the spray nozzle to facilitate removal of residual resins within the ion exchange column. The hazardous waste inventory in the ion exchange column will be considered removed upon completion of the waste removal process, as described previously, and a visual inspection of the unit to ensure that hazardous waste has been removed. Normal scaling associated with liquid waste systems and residual staining may be present. Small amounts of residue and ion exchange resin may also be present. Should it be determined, based on the inspection, that the hazardous waste inventory has not been removed from the unit, more aggressive removal methods may be employed or the units removed with the residual waste inventory in place and managed in accordance with Section 5.

The regenerant makeup tank (VES-SF-130) currently contains only nitric acid residuals. As only waste residuals are present in the tank, no additional waste removal activities will be conducted.

5.2.2 Removal and/or Decontamination of Tank System Components

The preferred closure approach for all tank system components is complete removal. Following hazardous waste removal, the duolite resin tank (VES-SF-131) and the regenerant makeup tank

(VES-SF-130) will be removed. The units will be removed, sized as necessary, and placed in DOT-approved waste shipping containers for transportation and subsequent disposal.

Should removal be determined to be impractical, the units will be iteratively decontaminated to ensure that the closure performance standard is met. The decontamination of VES-SF-131 will involve high-pressure spraying of decontamination solution (water) such that all interior surfaces of the unit being decontaminated are contacted by the decontamination solution and rinsate samples collected using a composite sampler built into the decontamination system (described in Subsections 5.1.1 and 5.1.2) to ensure that the closure ALs specified in Table 5-1 of this closure plan are met for each unit.

The regenerant makeup tank (VES-SF-130) is a large, open-top vessel and the internal tank surfaces are accessible; therefore, should removal be determined impractical, a high-pressure water spray will not be employed. Instead, the internal tank surfaces will be scrubbed using long-handled mops and brushes, and then rinsed with water. Following decontamination, the decontamination solution will be pumped to a waste container for temporary storage. Rinsate samples will be collected using a composite sampler built into the decontamination system to ensure that the closure ALs specified in Table 5-1 of this closure plan are met for each unit decontaminated.

Regenerant piping from the regenerant makeup tank (VES-SF-130), as identified in Table 2-1 and shown on Schematic P-CLOS-CPP-603-BWTS (see Figure 2-3), will be removed and disposed of as mixed HWMA/RCRA-contaminated debris. The piping and associated ancillary equipment will be removed, sized as necessary, and placed in DOT-approved waste shipping containers for transportation and subsequent disposal.

If decontamination is performed a second visual inspection may be conducted, as determined necessary. New Ion Exchange Subsystem piping and ancillary equipment to be removed during closure, as identified in Table 2-1, will be removed and disposed of as mixed HWMA/RCRA-contaminated debris. The piping and associated ancillary equipment will be removed, sized as necessary, and placed in DOT-approved waste shipping containers for transportation and subsequent disposal.

5.2.3 Decontamination of Secondary Containment Structures

The new ion exchange cubicle, a stainless steel-lined vault in CPP-603, the area immediately surrounding the regenerant makeup tank (VES-SF-130), and associated ancillary equipment will be inspected and any visible waste-related staining will be removed using physical techniques. Visible waste-related staining will be removed by scabbling, wiping, or the use of other physical/abrasive methods, as appropriate. Visible waste-related staining will be considered removed when the surface in question, when viewed without magnification, is free of all visible hazardous waste except that residual staining from waste consisting of light shadows, slight streaks, or minor discolorations, and waste in cracks, crevices, and pits may be present provided that such staining and waste in cracks, crevices, and pits shall be limited to no more than 5% of each square inch of surface area.

Portions of line 2" PSA-106398 are co-located in areas with various piping and ancillary equipment that is not undergoing HWMA/RCRA closure and the areas are not readily accessible for decontamination. Therefore, rather than decontaminate these areas the integrity of the line will be evaluated by pressure testing. If the integrity of the line is verified, no decontamination activities for the secondary containment structures associated with this line will be conducted during closure. If line integrity cannot be verified, all necessary actions will be taken to decontaminate the secondary containment structures to the standard identified above.

Wastes generated during decontamination of secondary containment surfaces will undergo a HWD and will be managed based on that HWD.

5.2.4 Tank System Isolation

The regenerant makeup piping to the Old Ion Exchange Subsystem will be cut and capped near the check valve located immediately upstream of the cross-connection with the basin water feed line (2" PBWA-101340). Regenerant feed line 3" PSA-105572 will be cut and capped immediately upstream of valve HCV-4.

At points where piping is removed during closure, associated connecting lines will also be capped. In addition to effectively isolating the tank system through physical means (i.e., cutting and capping), the floor drain located near the regenerant makeup tank and the floor drains in the new ion exchange cubicle and pump room, which are ancillary to VES-SFE-126, will be plugged.

Should removal of the duolite resin tank (VES-SF-131) and the regenerant makeup tank (VES-SF-130) be determined to be impractical, the units will be isolated by cutting and capping all tank inputs (e.g., air supplies and raw water supplies) near the tanks.

5.3 Closure Activities for the Old Ion Exchange Subsystem

5.3.1 Removal of Hazardous Waste Inventory

Waste (resin) will be removed from the ion exchange vessels (VES-SF-101 and -102) using the waste removal and decontamination system described in Subsections 5.1.1 and 5.1.2. Initially, clarified water from the waste container will be returned to the tanks through the spray nozzle to facilitate removal of residual resins within the ion exchange columns. The hazardous waste inventory in the ion exchange columns will be considered removed upon completion of the waste removal process, as described previously, and a visual inspection of the unit to ensure that hazardous waste has been removed. Normal scaling associated with liquid waste systems and residual staining may be present. Small amounts of residue and ion exchange resin may also be present. Should it be determined, based on the inspection, that the hazardous waste inventory has not been removed from the unit, more aggressive removal methods may be employed or the units removed with the residual waste inventory in place and managed in accordance with Section 5.

5.3.2 Removal and/or Decontamination of Tank System Components

The preferred closure approach for all tank system components is complete removal. Following hazardous waste removal, the ion exchange vessels (VES-SF-101 and -102) will be removed. The units will be removed, sized as necessary, and placed in DOT-approved waste shipping containers for transportation and subsequent disposal.

Should removal be determined to be impractical, the units will be iteratively decontaminated to ensure that the closure performance standard is met. The decontamination will involve high-pressure spraying of decontamination solution (water) such that all interior surfaces of the unit being decontaminated are contacted by the decontamination solution and rinsate samples collected using a composite sampler built into the decontamination system (described in Subsections 5.1.1 and 5.1.2) to ensure that the closure ALs specified in Table 5-1 of this closure plan are met for each unit.

Following decontamination, a second visual inspection may be conducted, as determined necessary.

5.3.3 Decontamination of Secondary Containment Structures

The old ion exchange cubicle, a stainless steel-lined vault in CPP-603, will be inspected and any visible waste-related staining will be removed using physical techniques. Visible waste-related staining will be removed by scabbling, wiping, or the use of other physical/abrasive methods. Visible waste-related staining will be considered removed when the surface in question, when viewed without magnification, is free of all visible hazardous waste except that residual staining from waste consisting of light shadows, slight streaks, or minor discolorations, and waste in cracks, crevices, and pits may be present provided that such staining and waste in cracks, crevices, and pits shall be limited to no more than 5% of each square inch of surface area.

Wastes generated during decontamination of secondary containment surfaces will undergo a HWD and will be managed based on that HWD.

5.3.4 Tank System Isolation

Should removal of the ion exchange vessels (VES-SF-101 and -102) be determined to be impractical, the units will be isolated by cutting and capping all tank inputs (e.g., air supplies and raw water supplies).

5.4 Closure Activities for the Reverse Osmosis and Acid Regenerant Subsystem

5.4.1 Removal of Hazardous Waste Inventory

Acid tank VES-SFE-133 and the reverse osmosis acid feed tank (VES-SF-140) contained stock solutions of nitric acid that became a waste subject to HWMA/RCRA regulations following inactivation of the BWTS. Nitric acid remaining in the tanks (approximately 220 gal) was removed in January 2002 and disposed of as hazardous waste (EPA HWNs D002 and D007) (IWTS 2002). Disposition of the nitric acid will be documented as part of the HWMA/RCRA closure certification of the BWTS. No additional waste removal actions will be taken during closure.

5.4.2 Removal of Tank System Components

Acid tank VES-SFE-133, associated containment pan, the reverse osmosis acid feed tank (VES-SF-140), and all associated piping and ancillary equipment as identified in Table 2-1 and shown on Schematic P-CLOS-CPP-603-BWTS (see Figure 2-3), will be removed and disposed of as HWMA/RCRA-contaminated debris. The tanks and associated ancillary equipment will be removed, sized as necessary, and placed in DOT-approved waste shipping containers for transportation and disposal.

5.4.3 Decontamination of Secondary Containment Structures

The containment pans associated with acid tank (VES-SFE-133) and the reverse osmosis acid feed tank (VES-SF-140) will be removed and managed as HWMA/RCRA-contaminated debris.

Since becoming a waste subject to HWMA/RCRA regulations, acid tank VES-SFE-133 has been provided with secondary containment that provides for at least 110% (555 gal) of the vessel's contents

(220 gal of nitric acid was removed from the tank in January 2002).^b There have been no identified releases of hazardous waste from the acid tank since the tank became subject to HWMA/RCRA regulations 90 days following inactivation of the BWTS.

To address potential historical releases from the tank prior to becoming subject to HWMA/RCRA regulations, the soils underlying the containment pan will be sampled for HWMA/RCRA constituents. Soil samples will be collected in accordance with the quality assurance project plan (INEEL 2007a) and field sampling plan (INEEL 2007b). Because the soils are within an existing FFA/CO site(s), a summary of the validated analytical data resulting from the soil sampling will be provided to the ICP CERCLA Program for evaluation during future remedial activities conducted under the FFA/CO; however, any CERCLA remedial actions that may be necessary for the soils underlying acid tank VES-SFE-133 will not be a criterion for HWMA/RCRA closure certification. A summary of the validated analytical data will also be included in the PE certification for closure of the BWTS.

The immediate area (epoxy-lined concrete) surrounding the piping associated with the reverse osmosis acid feed tank (VES-SF-140) and associated ancillary equipment will be inspected and any visible waste-related staining will be removed using physical techniques. Visible waste-related staining will be removed by scabbling, wiping, or the use of other physical/abrasive methods, as appropriate. Visible waste-related staining will be considered removed when the surface in question, when viewed without magnification, is free of all visible hazardous waste except that residual staining from waste consisting of light shadows, slight streaks, or minor discolorations, and waste in cracks, crevices, and pits may be present provided that such staining and waste in cracks, crevices, and pits shall be limited to no more than 5% of each square inch of surface area.

Wastes generated during decontamination of secondary containment surfaces will undergo a HWD and will be managed based on that HWD.

5.4.4 Tank System Isolation

As all system components associated with the Reverse Osmosis and Acid Regenerant Subsystem will be removed during HWMA/RCRA closure, no isolation activities are necessary.

5.5 Waste Management

As required by IDAPA 58.01.05.009 (40 CFR 265.114), contaminated equipment, structures, and soils (that will be managed as waste) must be properly disposed of or decontaminated in accordance with applicable requirements. Waste generated during BWTS HWMA/RCRA closure activities will include nonhazardous industrial waste, nonhazardous radioactive waste, HWMA/RCRA-hazardous waste, and mixed waste (both radioactive and HWMA/RCRA hazardous). All closure-generated wastes will undergo a HWD in accordance with IDAPA 58.01.05.006 (40 CFR 262.11). Closure-generated wastes will be placed in appropriate containers and will be managed/treated within the facility. All storage vessels used to accumulate liquid wastes will be secondarily contained. No soils will be managed as waste under this closure plan.

All generator requirements of IDAPA 58.01.05.006 (40 CFR 262) will be met except that the 90-day administrative timeframe stipulated in IDAPA 58.01.05.006 [40 CFR 262.34(a)(1), “Generator Standards: Accumulation Time”] will not apply to closure-generated waste. Greater than 90-day storage is necessitated by the nature of the wastes being managed (mixed radioactive waste) and the treatment that

b. Foster, J. K. INEEL, to M. E. Davis, INEEL, Interoffice Memorandum: “VES-SFE-133 Secondary Containment,” October 23, 2002.

will be conducted as part of closure activities. An additional 180 days (270 days total) is being requested to allow for the consolidation of similar waste streams; treatment of the hazardous waste removed from the BWTS units, including dewatering, grouting, and verification sampling; complete characterization of the various waste matrices for disposal; development of radioactive source terms; sampling and receipt of analytical data from the laboratory; and identification of appropriate disposition pathways.

Closure-generated waste may be managed, treated (solids), packaged, and stored within the facility being closed, as defined in this closure plan, provided the following waste management controls are implemented:

- Wastes generated will be managed in containers within the facility
- Containers are compatible with the waste and the containers are closed unless being filled
- Containers are inspected weekly to ensure integrity, and an inspection log is maintained or inspections are logged in the closure logbook
- Containers are clearly marked with hazardous waste labels or with labels identifying the waste as HWMA/RCRA-closure generated waste to be shipped or characterized, as appropriate
- Spill control equipment is provided adjacent to the container storage area.

For purposes of this closure, the facility will be defined as Building CPP-603 and the areas immediately south and east of the building, as posted, including the waste container storage area (CPP-2716) located north and east of the CPP-603 facility. For purposes of this closure, the facility may include the area shown in Figure 2-1. All waste and waste containers may be stored within the facility during closure activities and will be managed in accordance with the requirements of IDAPA 58.01.05.006 (40 CFR 262) (e.g., secondary containment and container compatibility with waste and treatment process). Provisions will be taken, as necessary, during closure to prevent possible failures of the waste containers (e.g., extreme temperature changes). Such provisions may include management of the containers within CPP-603, utilization of a temporary enclosure (e.g., rip tent) during inclement weather, or other appropriate controls, as determined necessary. Grouting activities will be conducted within a controlled environment (e.g., within Building CPP-603) meeting applicable HWMA/RCRA requirements. Once grouted, the waste containers may be managed within the facility, as defined above, until the grout has cured and adequate treatment has been confirmed.

All waste and waste containers will be removed from the facility prior to closure certification. All waste shipments shall be managed in accordance with the requirements of IDAPA 58.01.05.006 (40 CFR 262, Subpart B) and applicable DOT regulations (49 CFR 172, 173, 178, and 179). Such manifests shall include the notification required in IDAPA 58.01.05.011 (40 CFR 268.7), as appropriate. Information regarding waste management during closure activities will be provided to the independent PE for closure certification and will be maintained as part of the project file.

Table 5-2 identifies the anticipated waste streams that will be generated during HWMA/RCRA closure of the BWTS and the identified disposal pathways.

The hazardous waste inventory currently contained within the BWTS components will be removed and placed in HICs or other appropriate waste containers, as described in Section 5. The HICs may be selected because of the radiological characteristics of the waste to be generated and treated during closure and because HICs equipped with internal equipment for dewatering and grouting are commercially available, thus simplifying treatment activities to be conducted during closure. Per 10 CFR 20,

Appendix G, HIC is defined as a container commonly designed to meet the structural stability requirements of 10 CFR 61.56 and DOT requirements for Type A packages (49 CFR 173.410 and 412). The waste containers selected will be compatible with the waste to be stored/treated. The decanted liquids will be collected in a tank and disposed of based on a HWD. It is anticipated that the decanted liquids will be disposed of in the process equipment waste evaporator (PEWE) system at INTEC. To minimize the waste stream to the PEWE system, the water used in the waste removal and decontamination system will be clarified and reused as supply water to the system's spray nozzle.

Based on previous sampling activities, the dewatered solids remaining in the waste containers are expected to be HWMA/RCRA-characteristically hazardous waste (EPA HWN D006 [cadmium]). The dewatered solids will be treated by stabilization directly in the waste containers by blending with an appropriate stabilization matrix (e.g., grout). Issues such as radiation levels will affect the amount of solids that can be loaded in a waste container. A representative sample of the stabilized waste will be collected and analyzed to ensure that the waste form meets the standards of 40 CFR 268.40 for land disposal restrictions (LDRs) and 40 CFR 268.48 for underlying hazardous constituents. It is anticipated that the final waste form will meet all applicable RCRA regulatory limits for land disposal and can be disposed of as nonhazardous radioactive waste in the INL Radioactive Waste Management Complex (RWMC). Upon receipt of analytical data confirming the waste is no longer hazardous, the waste containers will no longer be subject to HWMA/RCRA and will, therefore, be managed as nonhazardous low-level waste. Should analytical data show that the treated waste is still hazardous or fails to meet the applicable LDR treatment standards, the affected container will be transferred to a RCRA-permitted storage facility (e.g., CPP-1617) until such time as an alternate treatment and disposal pathway can be identified.

Table 5-2. Anticipated waste streams and disposition path.

Waste Stream	Description	Anticipated Disposal Pathway
Industrial Waste	Personal protective equipment/other miscellaneous wastes	INL landfill complex
Radiological Waste (Low-Level Waste)	Personal protective equipment/other miscellaneous wastes	RWMC (radiological only)
Hazardous Waste	Dewatered solids from the BWTS	Stabilization to meet LDRs and disposal at the RWMC
	Tanks, piping, and other ancillary equipment removed during BWTS closure activities.	Storage at RCRA-permitted TSDF or off-Site macroencapsulation and disposal at a RCRA-permitted TSDF
Mixed Low-Level Waste	Decanted water from waste inventory removal/decontamination solutions	PEWE
	Tanks, piping, and other ancillary equipment removed during BWTS closure activities	Storage at RCRA-permitted TSDF or off-Site macroencapsulation and disposal at a RCRA-permitted TSDF

Prior to solids stabilization, the process chemistry and blending capabilities (e.g., type of grout and waste container loading) based on a worst-case surrogate waste stream will be defined. The surrogate waste will be used to form a grouting recipe to ensure compliance with LDRs.

All BWTS tank system components that are removed will be managed as HWMA/RCRA-contaminated/mixed HWMA/RCRA-contaminated debris. These components will be removed, sized as necessary, placed in DOT-approved waste shipping containers, and transported to a RCRA-permitted TSDF for macroencapsulation and subsequent disposal.

Where removal of system components is deemed impractical, decontamination of the BWTS system will be performed iteratively, as necessary, to minimize the volume of waste generated during closure activities. Between flush cycles, screening samples will be collected to determine whether further decontamination is necessary. Final rinsate samples will be collected after screening samples indicate the closure performance standard has been achieved. Rinsate sample analytical data will be used to support the characterization and disposition of liquid wastes generated during closure activities. It is anticipated that the decontamination solutions will be nonhazardous radioactive liquid waste and will be disposed of in the PEWE system.

5.6 Closure Documentation

Closure methods and attainment of the closure performance standards for the BWTS will be documented by performing the following:

- Closure activities will be monitored and reviewed by an independent PE registered in the State of Idaho. Following successful completion of closure activities, the PE will certify that closure was performed in accordance with the DEQ-approved closure plan.
- Information related to previous closure activities (e.g., disposition of nitric acid) and information gathered during closure activities will be recorded or documented, and provided to the PE, as requested, to support closure certification. Successful demonstration of achieving closure performance standards will require documentation of the following:
 - Waste removal, treatment, and disposition
 - Documentation of the removal, management, and disposition of system components
 - Validated sampling data showing that rinsates of each component not removed during closure meets the ALs specified in this closure plan
 - Documentation of the removal, management, and disposition of all closure-derived waste
 - Documentation of the decontamination of the secondary containment
 - Validated sampling data for the sand filter area sampling efforts.

6. CLOSURE SCHEDULE

Table 6-1 identifies the closure schedule that will be initiated following DEQ approval of this closure plan. This schedule reflects the time required for conducting closure activities and submitting information to the PE for certification.

IDAPA 58.01.05.009 (40 CFR 265.113) requires waste removal activities to be completed 90 days from the approval of the closure plan and closure to be completed within 180 days from the initiation of closure activities. An extension to these time periods is being requested at this time, pursuant to IDAPA 58.01.05.009 (40 CFR 265.113), to ensure that data of adequate quality are collected to show compliance with the closure performance standard. An extension to the 90-day waste removal period is requested at this time to protect worker health and to adequately perform waste removal activities. An extension is requested for the 180-day closure period to protect human health and the environment and to adequately perform closure activities. Waste removal, treatment, and closure activities cannot be completed within these timeframes due to several factors including, but not limited to, the following:

- Safety concerns associated with radiation fields within the vaults and around the tanks.
- INL Site health and safety requirements (e.g., Standard [STD]-101 work requirements, Integrated Safety Management System, and Voluntary Protection Program).
- The need for adequate time for analytical laboratories to complete analysis (normal turnaround of 45 days) of samples, to complete data validation (normal turnaround time of 30 days), to receive analytical results, and to complete data quality assessment, as specified in the quality assurance project plan (INEEL 2007a) to determine if the closure performance standard has been met.
- Complexities associated with removal and disposition of mixed wastes, including treatment, proper waste packaging, transport, and disposal issues.
- Treatment of the solids removed from the BWTS (described in Subsection 5.5) will require approximately 270 days to complete. Treatment will be conducted using a continuous flow process consisting of the following activities:
 - Solids will be slurried to waste containers equipped with internal equipment for dewatering and grouting (continuous process during waste removal activities)
 - Waste containers will be dewatered (completed as each waste container is fully loaded)
 - Samples of the slurried waste stream will be collected and analyzed, as necessary, to confirm grout recipe
 - Grout will be added to the waste containers (completed following dewatering)
 - Grout will be allowed to cure
 - Samples of the treated waste form will be collected and analyzed to demonstrate that the waste form meets LDR treatment standards and the disposal facility's waste acceptance criteria.

Table 6-1. BWTS closure schedule.

Activity	Completion ^{a, b}
DEQ approval of closure plan	Day 0 ^c
Complete removal activities for the Reverse Osmosis and Acid Regenerant Subsystem (VES-SFE-133, VES-SF-140, and associated ancillary equipment)	Day 60
Complete decontamination of the Reverse Osmosis and Acid Regenerant Subsystem (VES-SFE-133, VES-SF-140, and associated ancillary equipment) secondary containment	Day 300
Complete removal of the Regenerant Acid Makeup System (VES-SF-130) ancillary piping and equipment	Day 450
Complete bulk waste removal from the New Ion Exchange Subsystem, Old Ion Exchange Subsystem, and Multi-Media Sand Filter Subsystem	Day 540
Complete removal of the New Ion Exchange Subsystem vessel	Day 700
Complete removal of the Old Ion Exchange Subsystem	Day 820
Complete removal of the Multi-Media Sand Filter Subsystem and decontamination of secondary containment	Day 1050
Closure activities complete	Day 1110
PE and owner/operator certification submitted to DEQ	Day 1170 ^d

a. Because of the extended duration of this closure schedule, DOE will provide quarterly status reports to DEQ on progress of BWTS closure activities. The quarterly status reports will include justification for any delays hindering progress of closure activities.

b. If any of the closure activities are completed ahead of the proposed schedule, the subsequent activities will be completed an equal number of days ahead of schedule.

c. Day 0 was July 1, 2005.

d. If closure activities are completed ahead of the proposed schedule, the DOE Idaho Operations Office will submit the closure certification to DEQ within 60 days of the completion of closure activities. The subsequent approval from DEQ of the closure certification will be received within 60 days of this submittal.

7. CLOSURE PLAN AMENDMENTS

The conditions described in IDAPA 58.01.05.009 (40 CFR 265.112), “Closure Plan; Amendment of Plan,” will be followed to implement changes to the approved closure plan. Should unexpected events during the closure period require modification of the approved closure activities or closure schedule, the closure plan will be amended within 30 days of the unexpected event or the DEQ will be otherwise notified. A written request detailing the proposed changes and the rationale for those changes and a copy of the amended closure plan will be submitted to DEQ for approval. Minor changes to the approved closure plan, which are equivalent to or do not compromise the closure requirements and performance standards identified in the approved closure plan, may be made without prior notification to DEQ. Minor changes will be identified in the documentation supporting the independent PE’s certification.

8. CERTIFICATION OF CLOSURE

Within 60 days of completing the closure activities, a certification of closure of the BWTS will be provided, in accordance with IDAPA 58.01.05.009 (40 CFR 265.115), by an independent, Idaho-registered PE to the ICP operating contractor and the DOE Idaho Operations Office. The PE and owner/operator signatures on the closure certification will be submitted as a milestone deliverable under Subsection 9.8 of the VCO. The PE and owner/operator signatures on the closure certification, which is submitted to the DEQ, will document the completion of closure activities in accordance with the approved closure plan and State of Idaho HWMA/RCRA requirements. The closure certification may also identify any minor changes to the closure plan made without prior approval of the DEQ. Closure of the BWTS will be considered complete upon receipt of written acceptance issued by the DEQ.

Copies of documentation supporting the closure of the BWTS will remain in the project files, the VCO Program files, and the ICP Environmental Affairs Administrative Records in the event that information is requested by DEQ. The BWTS is not a hazardous waste disposal facility, and therefore, a "Notice in Deed" and a survey plat are not required.

9. COST AND LIABILITY REQUIREMENTS

The federal government, as owner of the INL Site, is exempt from the requirements to provide cost estimates for closure, to provide a financial assurance mechanism for closure, and regarding state-required mechanism and state assumption of responsibility. The federal government, as owner of the INL Site, is also exempt from liability requirements.

10. REFERENCES

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